CANADA-NOVA SCOTIA OFFSHORE PETROLEUM BOARD GEOPHYSICAL AND GEOLOGICAL PROGRAMS IN THE NOVA SCOTIA OFFSHORE AREA GUIDELINES FOR WORK PROGRAMS, AUTHORIZATIONS & REPORTS

SECTIONS

1.0 INTRODUCTION

2.0 OPERATING LICENCE

3.0 WORK AUTHORIZATIONS

4.0 CANADA - NOVA SCOTIA INDUSTRIAL BENEFITS

5.0 OTHER GOVERNMENT DEPARTMENTS & AGENCIES

6. REPORT REQUIREMENTS DURING FIELD OPERATIONS

6.1 WEEKLY PROGRESS REPORT

6.2 REPORTING OF SIGNIFICANT EVENTS

6.3 INSPECTION VISITS

7.0 FINAL REPORTS

7.1 REPORTING REQUIREMENTS

7.2 CONTENTS AND SUGGESTED FORMAT

7.3 ADDITIONAL REQUIREMENTS FOR 3-D SURVEYS

8.0 REQUIREMENTS FOR SEABED SURVEYS

8.1 GENERAL

8.2 OBJECTIVES

8.3 EXTENT AND COVERAGE

8.4 AUTHORIZATION

8.5 REPORTING REQUIREMENTS

8.6 DISPOSITION OF SAMPLES AND RESIDUAL
AND RESIDUAL TEST HOLE MATERIAL

9.0 CONFIDENTIALITY

FIGURE 1 - AREA OF BOARD'S JURISDICTION

FIGURE 2 - GEOLOGICAL/GEOPHYSICAL WORK AUTHORIZATION APPLICATION

1. INTRODUCTION

The Canada - Nova Scotia Offshore Petroleum Board (CNSOPB) is responsible for administering and regulating all aspects of Nova Scotia's offshore oil and gas activity. These guidelines were produced by the CNSOPB from the draft *Nova Scotia Offshore Petroleum Geophysical Regulations* in order to clarify and standardize program authorization and reporting requirements for geological and geophysical exploratory work and seabed surveys conducted offshore Nova Scotia.

These guidelines supersede the Canada Oil and Gas Lands Administration (COGLA) guidelines of January 1987.

On August 26,1986, the governments of Canada and Nova Scotia signed the *Canada - Nova Scotia Offshore Petroleum Resources Accord*, an agreement on the joint management of oil and gas exploration, development and production in the offshore area of Nova Scotia. Pursuant to this Accord the federal government passed the *Canada - Nova Scotia Offshore Petroleum Resources Accord Implementation Act* and the Nova Scotia government passed the *Canada - Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act*. This legislation created the Canada - Nova Scotia Offshore Petroleum Board (CNSOPB) which was established January 5, 1990 to administer and regulate all aspects of offshore oil and gas activities.

Figure 1 illustrates the area of offshore Nova Scotia that falls under the CNSOPB's authority.

All inquires concerning geophysical and geological programs, as well as seabed surveys can be directed to:

Manager, Offshore Petroleum Resources
Canada - Nova Scotia Offshore Petroleum Board
1791 Barrington St., 6th Floor
Halifax Nova Scotia
B3J 3K9

Telephone: (902) 422-5588
Facsimile: (902) 422-1799
Email: postmaster@cnsopb.ns.ca

All final reports and materials should be forwarded to:

CNSOPB Core Storage & Lab
Suite 27, Ancaster Place
201 Brownlow Avenue
City of Lakes Business Park
Dartmouth, Nova Scotia
B3B 1W2

Telephone: (902) 468-3994
Facsimile: (902) 468-4584

2. OPERATING LICENCE

Each person (company) who plans to conduct any activity related to the exploration for, or the development of oil and gas in the Nova Scotia Offshore Area must obtain an Operating Licence issued by the CNSOPB.

Operating Licences are valid from the date of issuance until the following March 31st and may be renewed from year to year. The annual fee is currently $25.00.

3. WORK AUTHORIZATIONS

The operator must obtain written authorization for any geophysical or geological program involving field work. (The term 'operator' as used in these guidelines means the person/company responsible for the application for authorization, the conduct of the program, and the reporting required under the relevant legislation and regulations).

Application must be made at least 30 days in advance of the proposed commencement date for a program. If the operator plans to use chemical explosives as a marine seismic energy source, application must be made at least 90 days in advance of the proposed commencement date. Application is made by submitting the following documentation to the CNSOPB:

i) three completed copies of the form "Geophysical/Geological Work Authorization" (see reduced copy in Figure 2). This includes a full description of the planned work program. A description for a reflection seismic program might read: 100 km of 6000% CDP reflection seismic, including gravity and magnetic data;

ii) three copies of maps showing the position of the proposed program and lines in relation to the existing geophysical/geological control in the area and the interests to which the program applies (exploration licences, significant discovery licences, production licences or exploratory permits);

iii) three copies of a page-size plat showing the location of the program area in relation to adjacent coastlines and other geographical features and boundaries;

iv) three copies of vessel specifications including the vessel's name, construction, registry and ownership, safety and lifesaving equipment and the navigation system.

All operations must adhere to the draft *Petroleum Occupational Safety and Health - Offshore Nova Scotia Regulations* (Petroleum OSH)

Upon approval, the signed "Authorization" grants the operator the necessary approval to conduct the program subject to any specified conditions.

The term of the authorization is for a period of no more than six months from the expected date of commencement as specified on the Authorization Application form. Any variation from the expected dates of commencement and other changes to the program must be reported to and authorized by CNSOPB.

The CNSOPB will assign a program number to each program for identification purposes. This number should be quoted by the operator in all subsequent references to the program.

4. CANADA - NOVA SCOTIA INDUSTRIAL BENEFITS

Prior to work authorization, the operator is to ensure that the geophysical contractor(s) will comply with the industrial benefits and employment commitments made by the operator in its Benefits Plan. Where an operator undertakes speculative or non-exclusive programs or programs on lands not held by that operator under an interest, an approved Benefits Plan must be in place prior to the authorization of activities. If the operator does not have a plan in effect, the CNSOPB should be contacted to ascertain the kind of plan required.

Additional requirements may apply if the operator plans to conduct work within the 12-mile limit.

5. OTHER GOVERNMENT DEPARTMENTS AND AGENCIES

The CNSOPB will notify all other concerned federal and/or provincial departments and agencies after it receives an application for work by an operator. At the same time, CNSOPB will request information from these agencies and departments which it will use in assessing the application.

6. REPORT REQUIREMENTS DURING FIELD OPERATIONS

6.1 WEEKLY PROGRESS REPORTS

The operator is responsible for submitting faxed reports to the CNSOPB at commencement and termination of the program and at weekly intervals during the program.

These progress reports may be sent by the prime contractor under direction from the operator. The CNSOPB must be notified of the person responsible for the reports prior to the commencement of the survey.

The weekly report should include the following:

(a) program number assigned by the CNSOPB ;

b) time period covered by the report;

(c) name of the operator or interest owner;

(d) latest known position of the vessel or the platform involved;

(e) number of line-kilometres shot to date and the number remaining to be shot;

(f) significant dates such as commencement, suspensions, re-commencement and completion of field work;

(g) additional information required as a condition of program approval;

(h) downtime due to weather, equipment failures, technical difficulties, etc.;

(i) next work assignment for the vessel or crew if known.

6.2 REPORTING OF SIGNIFICANT EVENTS

Major accidents, serious injuries or loss of life, or the sighting of an oil spill must be reported immediately to the CNSOPB chairman at (902) 422-5588 which is a 24 hour phone line.

6.3 INSPECTION VISITS

On-site inspection visits may be conducted by a geophysical inspector designated by the CNSOPB. The operator is expected to provide assistance to the inspector as required.

7. FINAL REPORTS

7.1 REPORTING REQUIREMENTS

The operator is required to submit a final report to the CNSOPB within twelve months following the termination of the field work.

The operator is required to submit five copies of the report which must contain the information described in Section 7.2. There should be an explanatory note in the text of the report under the appropriate heading pertaining to any of the required information which does not exist, will not become available, or is not applicable to this survey.

The report must be of a quality acceptable to the CNSOPB. It must be signed by a professional geophysicist or geologist. Any errors or omissions discovered after the final report has been submitted must be reported by the operator to the CNSOPB.

7.2 CONTENTS AND SUGGESTED FORMAT

The contents and suggested format of a final report are as follows:

(a) title page containing:

-program number (as assigned by the CNSOPB) ;

-operator's report name;

-type of survey;

-survey locality;

-time period and year of field work;

-name of program operator (or legal representative or agent) and interest holder(s);

-names of prime contractors;

-specific interests involved;

-name and signature of author or person responsible for the report;

-report date.

(b) Table of contents, list of enclosures.

(c) Introduction or abstract.

(d) Page size locality map showing the survey location with respect to the interests involved and indicating latitude/longitude co-ordinates.

(e) Statistical summary including:

-mobilization/demobilization dates;

-significant dates such as commencement, suspension, re-commencement, and termination;

-number of technical and non-technical personnel, and their nationality;

-production data including total distance surveyed, time lost, and daily production;

-summary of conditions pertaining to weather, terrain, ice conditions or sea state;

-summary of factors which caused significant downtime.

(f) Description of the data acquisition equipment and field procedures including:

-all components of the positioning system with estimates of accuracy and repeatability;

-all vessels or aircraft indicating ownership and flag or registry;

-the energy source detailing source array geometry;

-the detector equipment detailing detector array geometry;

-the recording system;

-the on-board processing facility;

-recording parameters such as shot or sweep interval, station interval, sampling rate, recording filter settings, and aircraft elevations.

(g) Description of the geophysical data processing should include:

i) for seismic reflection data, all processing for which sections were generated including every processing step such as:

- gain recovery;

-bandpass filter;

- mute pattern;

- type of deconvolution and parameters;

- type of velocity analysis, distance between analyses, and picking method;

- stacking velocities used if not listed on section labels;

- static correction method and parameters;

- time amplitude display method, length and application of scaling operations;

- percent of CDP stack;

- any special processing or display techniques.

ii) for gravity data:

- all corrections applied;

- method of correcting discrepancies at line intersections;

- method of spatial filtering, residual mapping and second derivative mapping;

- method of gravity modelling;

- loop closure maps for elevation control.

iii) for magnetic data:

- all corrections applied to the total field data;

- correction for diurnal;

- correction with regional field;

- method of spatial filtering, residual mapping and second derivative mapping;

- method of correcting discrepancies at line intersections;

- method of magnetic modelling.

(h) Seismic shotpoint maps, gravity station maps, track plots and flight lines with numbered fiducial points, on a working scale and shown in relation to the operator's previous data in the area. One paper print of each map should accompany each copy of the report. One mylar (film) copy of each shotpoint map is required along with a digital shotpoint location tape.

(i) Copies of each final migrated seismic section. If migrated sections were not created, copies of the last processing of non-migrated sections should be

submitted. One film (mylar) copy is required for each section. Pre-folded paper copies will be included in each report. Copies of other versions of the processed seismic may be requested.

(j) Bathymetry maps.

(k) Interpretative maps appropriate to the type of survey presenting the interpretation of data from this survey and relevant previous surveys as follows:

-for seismic reflection surveys all maps displaying time structure, depth structure, isopach, isochron, velocity, seismic amplitude and character change;

-for gravity surveys all maps displaying Bouguer gravity, residual gravity field, derivative maps, and, if maps were not made, individual gravity profiles with sufficient annotation for interpretation;

-for magnetic surveys all maps displaying total magnetic intensity, corrected total field, residual magnetic field, derivative maps, and if maps were not made, individual profiles with sufficient annotation for interpretation.

(l) Any other interpretative information such as synthetic seismograms, seismic modelling, or AVO studies.

(m) Written discussion of the maps and sections including geophysical to geological correlations, correlations between gravity, magnetic and seismic data, details of corrections or adjustments applied to the data during interpretation, examples of correlated seismic sections which illustrate the interpretative technique for structural and stratigraphic interpretation, and all velocity information used for time-to-depth conversion.

(n) Geological program reports should include a written discussion of the results of the project and tie the project into the regional geological framework. Illustrations should include the following where applicable:

-measured sections;

-correlation or structural cross-sections;

-core or sample descriptions;

-geochemical and other analyses;

-micro-paleontology and palynology;

-interpretative maps such as paleogeographic, facies, isopach, etc.

7.3 ADDITIONAL REQUIREMENTS FOR 3-D SURVEYS

The following information is required for 3-D seismic surveys in addition to the requirements specified in Section 7.2:

(a) positioning methods and estimate of accuracy and repeatability;

(b) methods for estimating the streamer position;

(c) methods of velocity analysis, static derivation and application, and migration;

(d) methods of grouping the data within the data volume;

(e) methods of interpolation for cross-lines and crooked lines;

(f) copies of all horizontal time slice sections, including those with special display options, such as instantaneous phase, frequency and amplitude. The number of paper and mylar copies required is as specified for seismic sections in Section 7.2 (i);

(g) copies of all crooked lines and cross-lines as specified in Section 7.2 (i).

8. REQUIREMENTS FOR SEABED SURVEYS

8.1 GENERAL

Seabed surveys are conducted to identify potential hazards from the seafloor to a depth of several hundred metres. These guidelines were designed for wellsite and other types of seabed surveys which are conducted primarily using geophysical techniques. Included in this group are pipeline route and production site surveys.

The following guidelines set out the information required from the survey, the methods that should be used to obtain the information and other details on the reporting requirements and submission of data.

8.2 OBJECTIVES

(a) Identify geological hazards that may affect the safety and efficiency of a drilling operation on the seafloor and seabed to a depth of several hundred metres;

(b) Produce detailed bathymetry of the survey area;

(c) Identify and map hazards associated with seafloor features such as iceberg scours, the morphology of sedimentary deposits and seafloor erosion;

(d) Determine the geological composition of the seabed sediments and the geotechnical characteristics of the seabed where required for bottom-founded drilling units;

(e) Identify any man-made hazards;

(f) Correlate the detailed site evaluation into the regional framework.

For guidance purposes it is suggested that these objectives may be achieved by using the following information and geophysical methods:

Identify geological hazards, based upon on-site data review such as slump scars, channels, faulting, gas, gas hydrates, and shallow trap closure	CDP seismic (sparker, small air gun, sleeve exploder)
Detailed bathymetry	Echo-sounder
Identify sediment type, boulder till, channel fills, slumping, faulting, and gas-charged sediments	High resolution subbottom profiler

Characteristics of seafloor sediments	Samples and/or gravity piston cores of seafloor and near-surface sediment
Identify iceberg scours, morphology of depositional units, sandwaves, archaeological relics, seafloor obstructions, and bedforms indicative of seafloor sediment dynamics	Side-scan Sonar, seabottom photography
Engineering data on seabed deformation, bearing capacity and stability	Bore hole core sampling, in situ and laboratory testing
Location and identification of seafloor installations, wrecks and cables	Magnetometer surveying (optional, as required)

8.3 EXTENT AND COVERAGE

The geophysical work must have the sufficient density and areal extent required to identify and evaluate hazards and tie the seabed geology into the regional framework. It is recommended that the area of coverage be large enough to allow some change of well location and identify dimensions of regional features such as large slump blocks in slope areas. An acceptable survey should have a line spacing of not more than 0.5 km in one direction, with appropriate cross-tie lines and tie lines to adjacent wellsite surveys. The number of samples and photos should be sufficient to provide ground truth for side-scan sonar and profiler data.

8.4 AUTHORIZATION

Authorization to conduct the seabed survey should be applied for in the same manner as any other geophysical or geological exploration program. This procedure is outlined in Section 3 of these guidelines.

Upon application, the operator must fully describe the proposed program, objectives to be attained and methodology to be used based on conditions at the proposed location

8.5 REPORTING REQUIREMENTS

A report of the survey results will be submitted to the CNSOPB no later than one year following completion of the field work and prior to the application for the Authority to Drill a Well.

Separate reports should be submitted for each individual wellsite or seabed investigation. Format, contents and number of copies of the report are specified in Section 7 of these guidelines. The following material specifically related to the seabed investigation will be included:

(a) Basic Technical Data

-One paper copy per report of each version of each high resolution CDP seismic section (Film mylar copies of the seismic sections or shot point maps are not required);

-Bathymetric profiles* in the form of annotated single paper copies;

-Subbottom profiler records* in single paper copies;

-Digital shotpoint location tape

-Side-scan data* in the form of single paper copies of corrected or uncorrected records;

-Survey logs and acquisition reports including the details of acquisition parameters, filter settings, correction algorithms, and significant events;

-Full description of field observations and subsequent analysis of grab samples;

-Prints of all bottom photographs;

-Paper copies of all borehole logs and in situ test results;

-Prints of all core photographs.

*(Bathymetric profiles, subbottom profiler records and side scan data must be included with the report if the operator plans to discard them. If at any time in the future, the operator intends to discard these data, prior authorization must be obtained from the CNSOPB. Otherwise, the data may be retained in the operator's file for possible future examination. Examples of each type of data should be contained in the report in order to fully illustrate the interpretation.)

(b) Interpretation of Data

-Detailed bathymetric map;

-Identification of any near surface hazards such as faults, boulder beds, slumps, buried channels, gas pockets, and pock marks;

-Results of side-scan sonar surveys including side-scan mosaics and a description and discussion of the distribution and morphology of sedimentary units, pock marks, seafloor photographs, seafloor features such as sediment distribution and where appropriate, a discussion of ice scours with an analysis of scour density, cross-sectional shape, depth of sediment disturbance and dimensions;

-Seafloor sediment map;

-Structure maps and isopach maps based on the high resolution CDP seismic data for key events;

-Location map and lithologic description of samples and cores, results of geochemical investigations and any other studies carried out as part of the survey;

-Examples of the correlation of acoustic records and seismic sections with bore hole logs, in situ test profiles or other geological information;

-Description of representative bottom photographs sufficient to document the interpretation and giving information on:

- location;

- area of the seafloor covered by the image;

- identification of the sediment.

-Identification of man-made obstacles.

8.6 DISPOSITION OF SAMPLES AND RESIDUAL TEST HOLE MATERIAL

All bottom samples and geotechnical test hole materials not used for analysis should be properly preserved, packed or stored and forwarded to the CNSOPB Core Storage & Laboratory. All materials must include reference to the original CNSOPB program number, a brief description of the relevant survey and a detailed inventory list of all materials submitted.

9. CONFIDENTIALITY

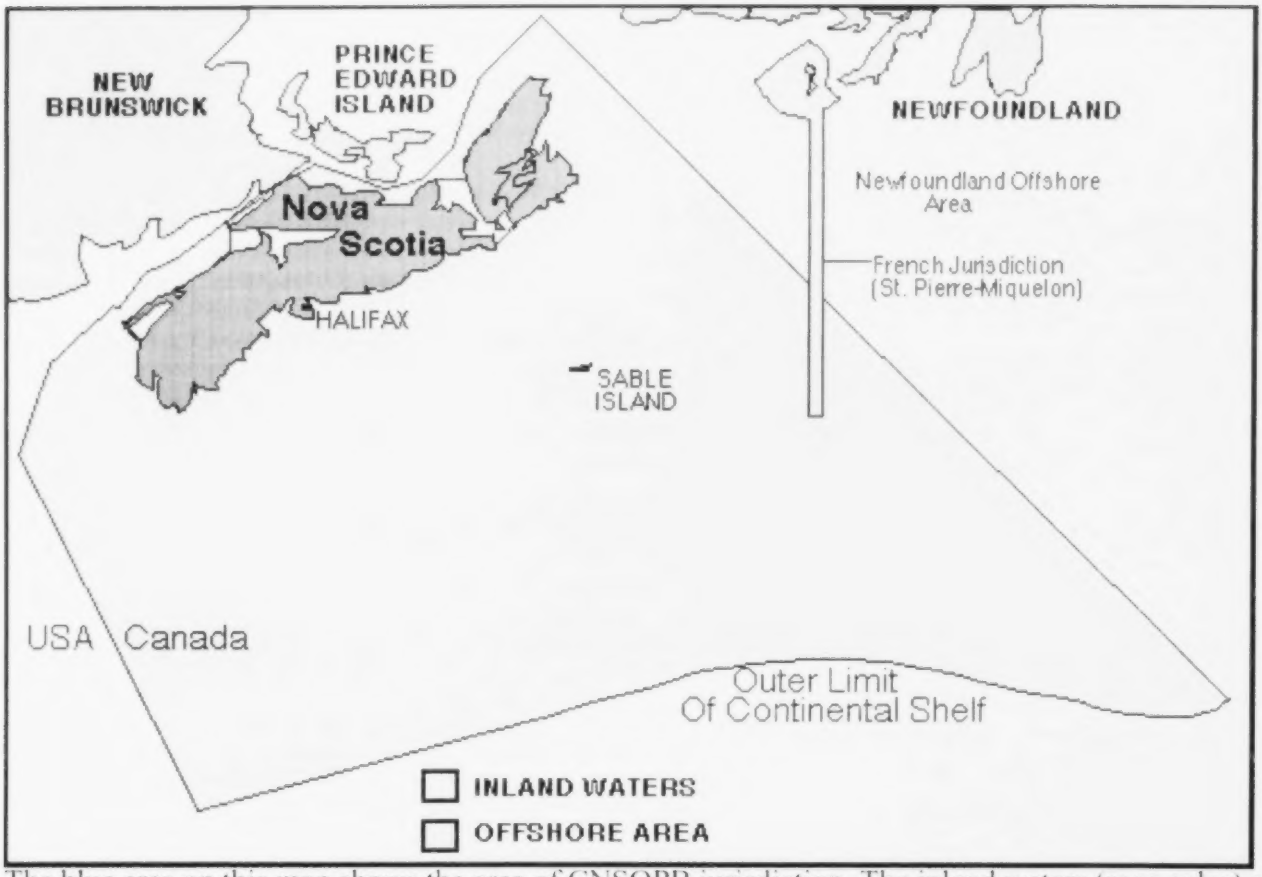
Exclusive geophysical and geological reports, maps, data and other materials are kept confidential for 5 1/2 years after termination of the field work.

Non-Exclusive or Speculative geophysical data, reports and maps will be kept confidential for at least ten years from the completion of the field work.

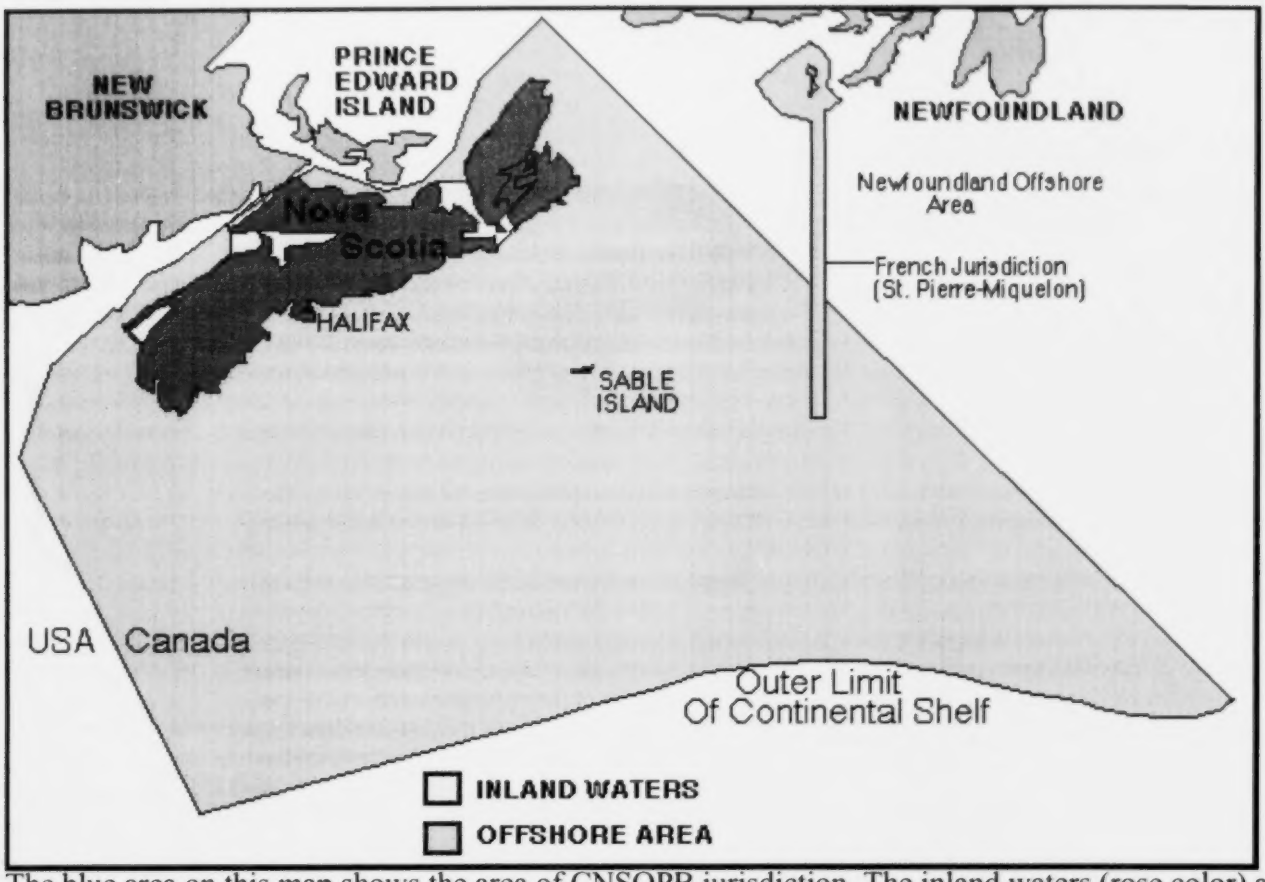
For site survey information, the geological and geophysical data, report and materials will be kept confidential for the same period of time as information for the well over which the site investigation was conducted. Where a well is not drilled, the period of confidentiality for the report and data will be five and one-half years from the date of completion of the field work.

Reports and data are made available to the public at the termination of relevant confidentiality periods.

During the confidentiality period, the Chief Conservation Officer may inform other operators in the area if a relevant hazard is detected by a site survey.



The blue area on this map shows the area of CNSOPB jurisdiction. The inland waters (rose color) and the land areas (red) are provincial jurisdiction.



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